CASE REPORT

Herpes Zoster Cervical Myelitis in a Young Adult

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Varicella zoster virus infection, which causes chickenpox and herpes zoster (HZ), is not uncommon in the general population. Varicella zoster virus can be latent in cranial nerve or dorsal root ganglia, and reactivate several decades later to produce vesicles with post-herpetic neuralgia. HZ myelitis usually occurs in elderly or immunocompromised patients. We report here a case of HZ myelitis of the cervical spinal cord in a 35-year-old woman who was immunocompetent. Cervical myelitis developed 1 month after the eruption of vesicles. Pure sensation loss was limited initially from the C2 to T1 dermatomes, but later progressed to lower limb sensory loss and sphincter function impairment. The patient's motor function was also mildly affected. Despite the initial rapid neurological deterioration, the symptoms dramatically improved after 5 days of parenteral acyclovir and steroid administration with rehabilitation. We therefore propose that early medical intervention is necessary for better and earlier recovery. [*J Chin Med Assoc* 2010;73(11):605–610]

Key Words: acyclovir, herpes zoster, immunocompetent, myelitis, steroids

Introduction

Varicella zoster virus (VZV) infection, which causes chickenpox and herpes zoster (HZ), is a common disease in the aged and immunocompromised populations. Myelitis is an uncommon complication of VZV infection, and it is even rarer in immunocompetent patients. Prompt diagnosis and early intervention are crucial to minimize morbidity in HZ keratitis and ophthalmicus,[1] but there is a lack of reports to support the same with respect to HZ myelitis. We describe herein a 35-year-old woman who was immunocompetent, but who had HZ that progressed to cervical myelitis.

Case Report

A 35-year-old woman presented with vesicles on the dermatome of her right T1 spinal nerve innervation, with spontaneous remission 1 week later, except for persistent numbness and itching sensation. After 1 month, recurrent vesicular eruption with gradual loss of temperature sensation and proprioception in her right fingers was noted. In addition, there were pain and numbness in her right dermatomes from C2 to T1. Two days later, she could not grasp anything or raise her right arm. Her neurological examination showed that the muscle strength in her right shoulder, elbow, and wrist was decreased (shoulder abduction was grade 3; right elbow and wrist flexion/extension were grade 4). Her other 3 limbs demonstrated normal muscle strength. Cerebrospinal fluid (CSF) analysis via lumbar puncture showed pleocytosis with lymphocytic predominance (white blood cell count, 25; red blood cell count, 12; N/L/M, 2/90/8), low protein (34.6 mg/dL), and normal glucose concentrations (69 mg/dL, and blood glucose was 103 mg/dL then). The patient's serum differential lymphocyte cell counts were within normal limits (CD3/4/8/10, 62/32/30/10). Screening tests by enzyme-linked immunosorbent assay for human immunodeficiency virus, *Treponema pallidum* hemagglutination, and varicella/zoster (IgG/IgM) were all negative in the serum and CSF. HZ culture from serum and CSF yielded negative results as well. Cervical spinal magnetic resonance imaging (MRI) showed expansive intramedullary lesions with focal swelling, which was compatible with inflammation (Figure 1). Electromyography

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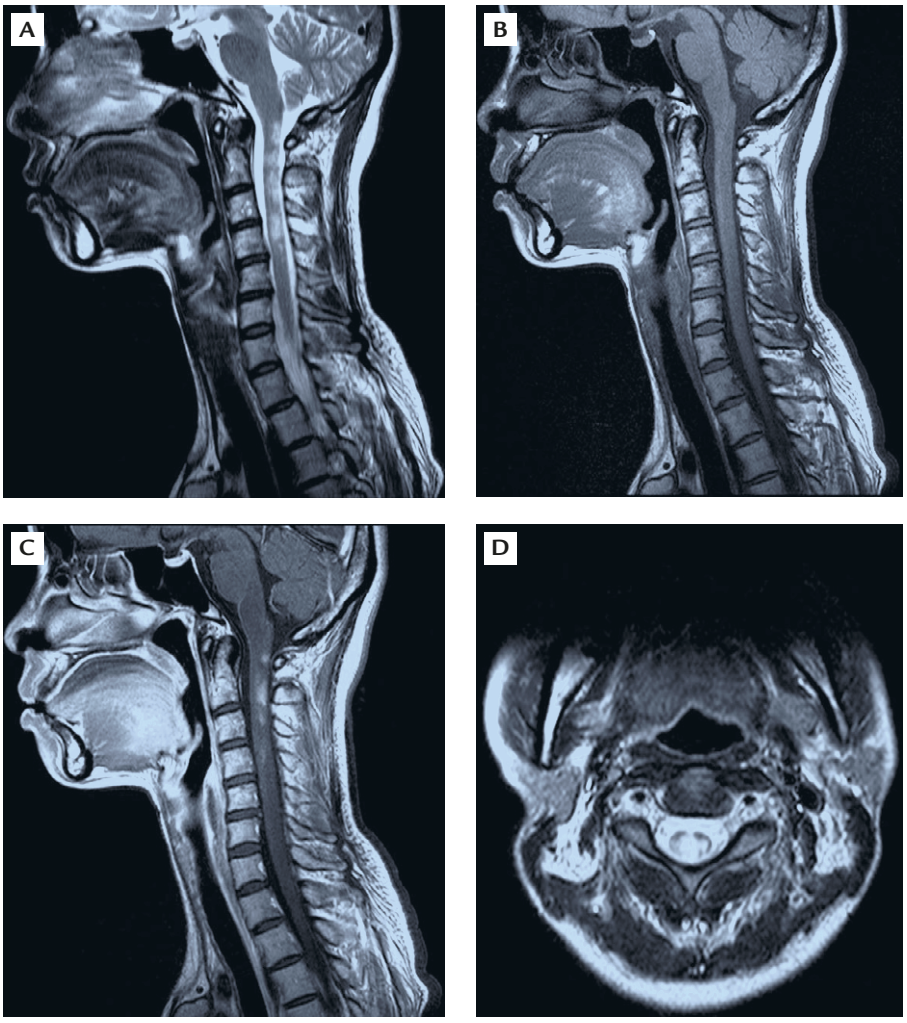
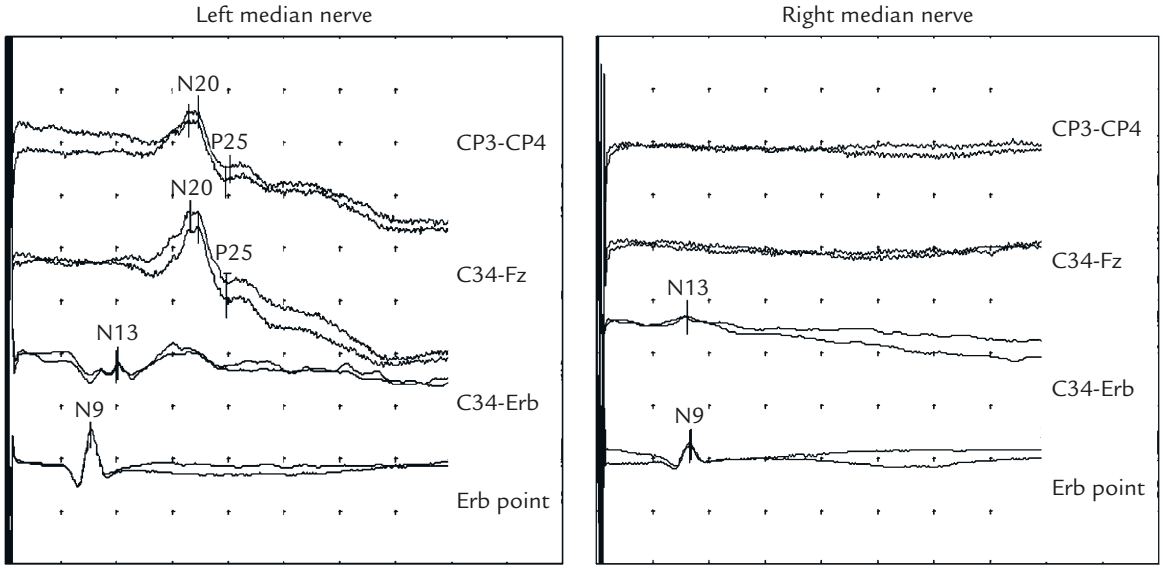


Figure 1. Cervical spinal magnetic resonance imaging (1 month after onset of herpes zoster). Multiple expansive intramedullary lesions with: (A) high signal intensity on sagittal T2-weighted images; (B) low signal intensity on sagittal T1-weighted images; (C) enhanced on post-contrast medium T1-weighted images; and (D) axial T2-weighted images were demonstrated. Jumping lesions were found at the level of C1 to C5, with focal edematous change.

and motor evoked potential (MEP) (performed on admission day 2) showed no motor function involvement, but somatosensory evoked potential (SSEP) found an asymmetric cortical response with lower amplitude during stimulation of the right wrist. The lesion was located from Erb's point to the sensory cortex by electrophysiological studies (Figure 2).

Under the impression of HZ myelitis of the cervical spinal cord, the patient received a course of acyclovir treatment that began on admission day 4 (500 mg twice daily intravenously for 7 days and orally for 7 days; Figure 3). Loss of proprioception and temperature sensation of the right lower limb occurred at that time. However, the muscle power of the corresponding region of the right lower limb was normal. The patient's gait became unsteady, and she needed to look down at her right leg movements when attempting to walk. The deep tendon reflexes were brisk with plantar extension on the right. Moreover, her neurological function continuously deteriorated, with urinary retention and stool incontinence. We also prescribed dexamethasone (5 mg every 8 hours for 10 days) for spinal cord edema.

Gradual improvement was observed 9 days after the onset of neurological deficits (day 5 of acyclovir administration). The sequence of neurological recovery was: sensory function of the right lower limb (9 days after the onset of neurological deficits); gait (14 days); urinary/stool incontinence (18 days); and finally, sensory function of the right upper limbs (>6 months). General improvement of the patient's neurological functions was observed, except that fine movement impairment of the right hand remained at 6 months' follow-up.



Protocol/Run	N9	N13	N20	P25	N20
	ms	ms	ms	ms	μV
Left median nerve					
1 CP3-CP4	7.70	10.15	16.45	19.75	2.4
2 CP3-CP4	7.70	10.10	17.25	20.15	2.1
Right median nerve					
1 CP3-CP4	8.45	8.10			
2 CP3-CP4	8.30	8.15			

Figure 2. Somatosensory evoked potential (SSEP) of the left arm compared with the right arm. Abnormal median SSEPs were due to an asymmetric cortical response with lower amplitude during stimulation of the right wrist.

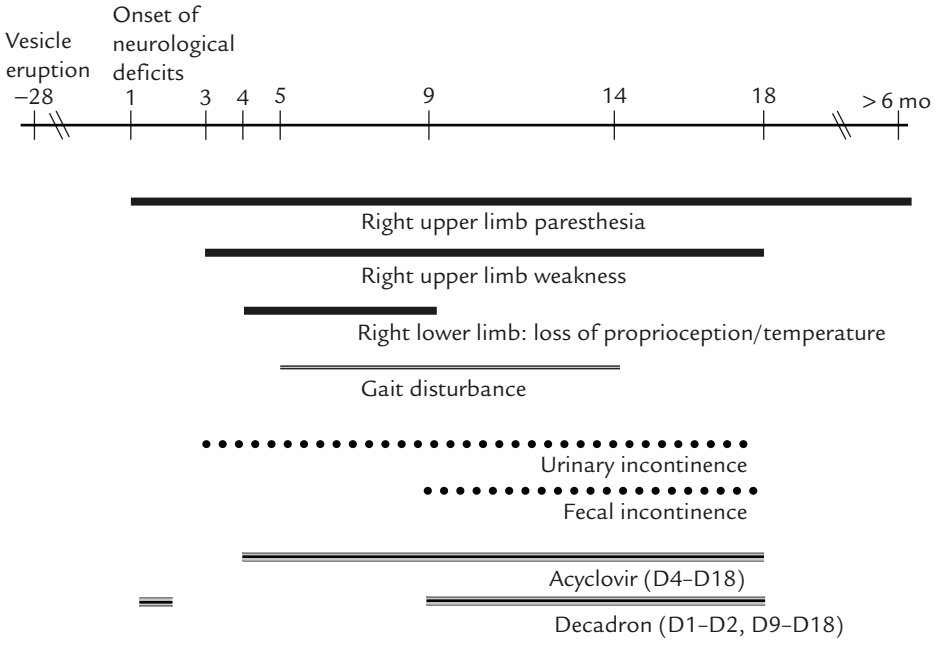


Figure 3. The timetable of the entire admission course. The maximal deficits occurred on admission day 9. The timing of treatment with acyclovir and dexamethasone is shown.

Table 1. Varicella-zoster myelitis in immunocompetent patients since 1990

Reference (year)	Age, sex (type of presentation)	Myelitis location	Onset of rash to myelopathy	Myelopathy to drug administration	Improvement	Complete recovery	Acyclovir	Dexamethasone
Rosenfeld et al[7] (1993)	18 yr, female (varicella)	C4–5, T2–8	6 d	2 d	3 d	10 d	15 mg/kg/d for 14 d	MTP 250 mg q6h IV for 5 d
Yang et al[8] (1994)	22 yr, male (varicella)	–	10 d	–	–	–	–	–
Gilden et al[6] (1994)	27 yr, female (zoster)	C1, C4–5, conus	A few months (< 4 mo)	–	–	Progress to encephalitis in 3rd recurrence	10 mg/kg q8h IV for 14 d (1st & 2nd) 800 mg/5 times/d PO for 14 d (3rd)	–
	47 yr, female (zoster)	T-spine	14 d (1st), 0 d (recurrence)	–	–	> 6 mo (Lt leg weakness)	15 mg/kg tid IV (3rd)	Dex (1st) P 20 mg tid for 4 wk (2nd) Dex 24 mg/d for 10 d (3rd)
	23 yr, male (varicella)	T-spine	0 d (at the same time)	–	7 d	> 6 mo (feet numbness)	3 g/d for 4 d	16 mg/d for 3 d
Baik et al[5] (1997)	27 yr, female (zoster)	C2–C5	4 d/7 d	0 d	–	3 wk	1,500 mg/d IV for 7 d and PO for 10 d	20 mg/d for 7 d
Mehndiratta et al[4] (2000)	35 yr, female (zoster)	C2–C5	21 d	0 d	3 d	4 wk	500 mg q8h IV for 10 d	–
Present case (2010)	35 yr, female (zoster)	C1–C5	28 d	3 d	9 d	> 6 mo (Rt hand clumsiness)	500 mg bid IV for 7 d and PO for 7 d	5 mg q8h IV for 10 d

MTP = methylprednisolone; q6h = every 6 hours; IV = intravenous; q8h = every 8 hours; PO = per oral; Lt = left; Dex = dexamethasone; P = prednisolone; tid = 3 times daily; Rt = right; bid = 2 times daily.

Discussion

VZV myelitis is an unusual inflammatory disease that involves any part of the spinal cord. The frequency of myelitis during or after varicella or zoster infection is 0.3%,[2] and most patients are immunocompromised. The typical symptoms are paresthesia at a certain level, paraparesis, quadriparesis, and impaired sphincter function. In most cases, the vesicular lesions are found prior to neurological symptoms. However, myelitis associated with varicella or zoster has been described in the absence of typical skin lesions.[3]

In 6 studies of zoster- or varicella-induced myelitis conducted since 1990, 8 immunocompetent patients have been reported (Table 1). Most of these 8 patients were female (6/8), and their ages ranged from 18 to 47 years. Myelitis was located in the cervical spinal cord in 4 patients, thoracic spinal cord in 3, and both in 1. The timing of development of myelopathy in relation to the onset of the vesicles varied from 0 days to several months. After administration of acyclovir, the interval prior to symptom improvement ranged from 3 to 9 days. Complete recovery could be seen in 10 days, but 4 patients were left with permanent neurological deficits, such as weakness or numbness, or had even progressed to encephalitis at 6 months' follow-up.[4–8]

According to these previous reports, the diagnosis of VZV myelitis can be challenging. Although blood tests, MRI of the spine, and spinal tap can help us to narrow down the diagnostic possibilities, it is important to maintain a high index of suspicion in cases with typical clinical presentation.[9] First, T2-weighted MRI is the most sensitive imaging modality for VZV myelitis. There were several focal areas of hyperintensity with various extents of edema in the T2-weighted images in our case. VZV myelitis often presents as multiple lesions that are not restricted to 1 level or adjacent levels; lesions that span several segments of the spinal cord have been reported. The lesions can spread eccentrically from the dorsal ganglia, and the degree of contrast enhancement can vary without correspondence to clinical improvement.[6,10–12] Second, detection of VZV antibodies in the CSF is a pathognomonic laboratory finding for the diagnosis of myelitis. Gilden et al[13] reported that polymerase chain reaction for VZV DNA and antibody in the CSF is always positive in VZV-associated myelitis. However, VZV antibody might be negative in some cases, even with the high sensitivity of the test.[7] In Rosenfeld et al's case report,[7] the patient had significant clinical presentation of VZV myelitis, but PCR for VZV DNA and antibody, viral isolation, and viral culture were all negative. We suggest that the key to VZV myelitis diagnosis is clinical manifestations, which are most commonly the typical vesicular eruptions, followed by neurological deterioration (including asymmetrical neurological findings, initial sensory dysfunction, and late-onset motor dysfunction).

In terms of electrophysiological evaluations, only a few studies have used electromyography, SSEP and MEP as adjuvant diagnostic tools for HZ myelitis. Ikeda et al[14] and Gilden et al[6] discussed the decrease (even loss) of amplitude in SSEP of HZ myelitis patients. However, motor nerve conduction velocity is nearly normal, with slightly decreased F wave response.[6] The value of SSEP is not only to localize the lesion, but also to suggest HZ myelitis. In our patient, we also found dissociation of sensory and motor function deficits, which has not been reported in the literature. Moreover, follow-up SSEP (3 months after the onset of myelopathy) revealed that the sensory nerve was indeed significantly recovered after treatment, which was different from myelitis due to other causes. Therefore, SSEP and MEP might be useful to follow up VZV myelitis.

Currently, there is no standard treatment for VZV myelitis. Most researchers have suggested high-dose acyclovir and steroids, but the optimal dosage remains controversial, especially for immunocompetent patients. Table 1 demonstrates the various doses, frequencies, and routes of administration that have been reported. Two large controlled studies have clarified the role of combination therapy of acyclovir and corticosteroids for VZV infection, and have shown that patients benefited from corticosteroids to reduce the duration of acute neuritis.[15,16] In the literature review of VZV myelitis in immunocompetent patients, the longer the interval between onset of myelopathy and administration of acyclovir/corticosteroids, the slower the observed improvement, and the longer the recovery time. There might be residual or permanent neurological deficits in spite of contemporary treatment, which does not seem to be correlated with dose, frequency, or administration route of acyclovir and corticosteroids. Early medical intervention might be the most important prognostic factor. Correlation of the above findings with our experience leads us to suggest that the earlier acyclovir treatment is administered, the more likely a better neurological recovery can be anticipated.

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